Spermatogonial Dedifferentiation May Be a Pre-Programmed Mechanism of Germline Stem Cell Repopulation in the *Drosophila* Testis

Crista Brawley, X. Rebecca Sheng, and Erika Matunis

The Johns Hopkins University School of Medicine, Baltimore, MD

In the *Drosophila* testis there are two types of stem cells, germline stem cells (GSCs) and somatic stem cells (SSCs). The GSCs are maintained via the Jak-STAT signaling pathway. When Jak-STAT signaling is suppressed, GSCs differentiate. Upon restoration of signaling, differentiated spermatogonial cysts break down and dedifferentiate, generating functional GSCs to repopulate the stem cell niche (Brawley and Matunis, 2004). The SSCs also are lost and return when Jak-STAT signaling is quelled and regained, respectively. Thus, Jak-STAT is required to maintain SSCs. But whether the mechanism of dedifferentiation of the germline requires the participation of the soma is being investigated genetically. It is known that when Bam is ectopically expressed GSCs differentiate (Ohlstein and McKearin, 2004 and Kawase, et al., 2004). Our preliminary data reveal that these testes can also repopulate their GSCs by spermatogonial dedifferentiation and cyst breakdown. Interestingly, SSCs and somatic cyst cells completely occupy the niche severely limiting the number of spermatogonial cysts within the niche. The somatic cell accumulation in the niche does not inhibit dedifferentiation of spermatogonial cysts or GSC repopulation, but rather the frequency of GSC repopulation increases in this background. This outcome suggests that the germline is pre-programmed to dedifferentiate and has the ability to hone in on the niche to repopulate it.

References

1. Brawley C, Matunis E. *Science.* 2004;304(5675):1331-1334.
2. Kawase E, et al. *Development*. 2004;131(6):1365-1375.
3. Ohlstein B, McKearin D. *Development*. 1997;124(18):3651-3662.